Unit 10
Day 3
Rational Inequalities
Section 2.7 of textbook

Example 1

$$\frac{2x-1}{3x+4} < 5$$

$$\frac{2x-1}{3x+4} - 5 < 0$$

$$\frac{2x-1}{3x+4} - \frac{15x+20}{3x+4} < 0$$

$$\frac{-13x-21}{3x+4} < 0$$

Note must set the inequality "equal" to 0. You can not cross-multiply. That property of proportions only works with equations

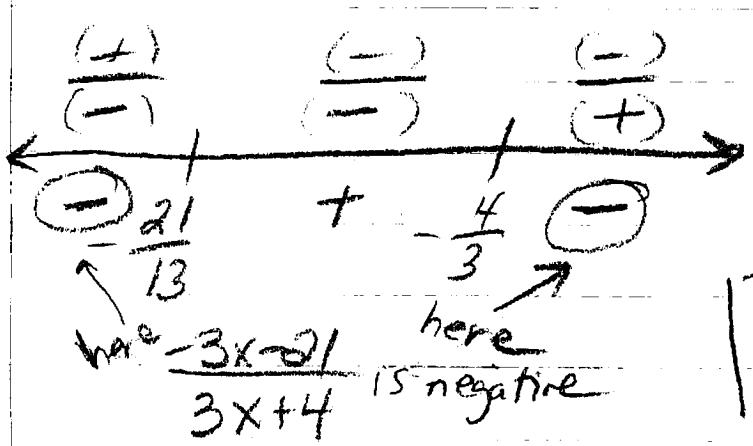
CV $-13x-21=0$ $3x+4=0$

$x = -\frac{21}{13}$ $x = -\frac{4}{3}$

Note The critical values are found by setting the num. + den each equal to 0. This tells you the values where the sign change may occur

Sign graph

$\frac{-13x-21}{3x+4}$



Answer:

$$\left(-\infty, -\frac{21}{13}\right) \cup \left(-\frac{4}{3}, \infty\right)$$

EXAMPLE 2

$$\frac{x-2}{x+3} \geq 2$$

① Set it "Equal" to zero

$$\frac{x-2}{x+3} - 2 \geq 0$$

② Combine expressions

$$\frac{x-2}{x+3} - \frac{2x+6}{x+3} \geq 0$$

$$\frac{-x-8}{x+3} \geq 0$$

③ Find critical value

CV $x=-8$, $x=-3$

④ Do sign graph

$\frac{-x-8}{x+3}$: $\frac{+}{-}$ | $\frac{-}{-}$ | $\frac{-}{+}$

Result → $-$ -8 $(+)$ -3 $-$

Solution

ANSWER: $[-8, -3)$

NOTE: denominator can not = zero.

Example 3

$$\frac{3}{x+4} \leq \frac{5}{x-3}$$

* Do NOT cross MULTIPLY

$$\frac{3}{x+4} - \frac{5}{x-3} \leq 0 \Rightarrow \frac{3x-9}{(x+4)(x-3)} - \frac{5x+20}{(x-4)(x-3)} \leq 0$$

$$\frac{-2x-29}{(x+4)(x-3)}$$

CV $-2x-29=0$ $x+4=0$ $x-3=0$

$x=-\frac{29}{2}$ $x=-4$ $x=3$

$\frac{-2x-29}{(x+4)(x-3)}$: $\frac{(+)}{(-)(-)}$ | $\frac{(-)}{(-)(-)}$ | $\frac{(-)}{(+)(-)}$ | $\frac{(-)}{(+)(+)}$

Result → $+$ $-\frac{29}{2}$ $-$ -4 $+$ 3 $-$

Solution Solution

ANSWER: $\left[-\frac{29}{2}, -4\right) \cup (3, \infty)$

Remember denom $\neq 0$